

CLAIMS:

Sub A1

1. A device for producing laser radiation having a wavelength of about $2\mu\text{m}$, the device comprising:

a solid-state sample capable of producing lasing transitions corresponding to a wavelength of about $2\mu\text{m}$; and

a source of pumping radiation having a wavelength of about $1\mu\text{m}$, the source being arranged so that at least some of the radiation produced thereby is absorbed by the solid-state sample, causing the solid-state sample to emit radiation having a wavelength of about $2\mu\text{m}$.

2. A device according to Claim 1, wherein the solid-state sample is a Ti:YAG sample.

3. A device according to Claim 1, wherein the source of pumping radiation having a wavelength of about $1\mu\text{m}$ comprises a $1\mu\text{m}$ resonant cavity having the solid-state sample located substantially therein.

4. A device according to Claim 3, wherein the resonant cavity comprises a Nd:YAG sample and a first pair of members that are substantially reflective to radiation having a wavelength of about $1\mu\text{m}$, the Nd:YAG sample being substantially interposed between the first pair of members.

Sub A2

5. A device according to Claim 4, comprising a source of pumping radiation for the Nd:YAG sample to stimulate the Nd:YAG sample to emit radiation having a wavelength of about $1\mu\text{m}$.

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6. A device according to Claim 5, wherein the source of pumping radiation for the Nd:YAG sample comprises a plurality of arrays of laser diodes.
7. A device according to Claim 5, wherein the source of pumping radiation for the Nd:YAG sample comprises a plurality of flashlamps.

Sub A3

8. A device according to Claim 1, wherein the solid-state sample is substantially interposed between a second pair of members, at least one of which is substantially reflective to radiation having a wavelength of about $2\mu\text{m}$.

9. A device according to Claim 8, wherein the second pair of members is located substantially within the source of radiation having a wavelength of about $1\mu\text{m}$.

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10. A device according to Claim 1, wherein the device produces laser radiation having a wavelength of substantially $2.02\mu\text{m}$.

11. A device according to Claim 1, wherein the source of radiation having a wavelength of about $1\mu\text{m}$ is a source of radiation having a wavelength of substantially $1.064\mu\text{m}$.

Sub A4

12. A method of producing laser radiation having a wavelength of about $2\mu\text{m}$, the method comprising the steps of:

providing a solid-state sample capable of producing lasing transitions corresponding to a wavelength of about $2\mu\text{m}$; and

emitting pumping radiation having a wavelength of about $1\mu\text{m}$ so that at least some of the radiation having a wavelength of about $1\mu\text{m}$ is absorbed by

(44 cont.) the solid-state sample, causing the solid-state sample to emit radiation having a wavelength of about $2\mu\text{m}$.

13. A method according to Claim 12, wherein the step of providing a solid-state sample comprises the step of providing a Tm:YAG sample.

14. A method according to Claim 12, wherein the step of emitting pumping radiation having a wavelength of about $1\mu\text{m}$ comprises the step of providing a resonant cavity having the solid-state sample located substantially therein.

15. A method according to Claim 12, wherein the step of providing a resonant cavity comprises the steps of:

providing a Nd:YAG sample; and

providing a first pair of members that are substantially reflective to radiation having a wavelength of about $1\mu\text{m}$, the Nd:YAG sample being substantially interposed between the first pair of members.

Sub 957 16. A method according to Claim 15, comprising the steps of:

providing a source of pumping radiation for the Nd:YAG sample; and

stimulating the Nd:YAG sample with the pumping radiation to cause the Nd:YAG sample to emit radiation having a wavelength of about $1\mu\text{m}$.

B17 17. A method according to Claim 16, wherein the source of pumping radiation for the Nd:YAG sample comprises a plurality of arrays of laser diodes.

18. A method according to Claim 16, wherein the source of pumping radiation for the Nd:YAG sample comprises a plurality of flashlamps.

19. A method according to Claim 12, further comprising the steps of:
providing a second pair of members, at least one of which is substantially reflective to radiation having a wavelength of about $2\mu\text{m}$; and
interposing the solid-state substantially between the second pair of members.
 20. A method according to Claim 19, further comprising the step of locating the second pair of members substantially within the source of radiation having a wavelength of about $1\mu\text{m}$.
 21. A method according to Claim 12, wherein the method produces laser radiation having wavelength of substantially $2.02\mu\text{m}$.
 22. A method according to Claim 12, wherein the step of emitting pumping radiation having a wavelength of about $1\mu\text{m}$ comprises the step of emitting pumping radiation having a wavelength of substantially $1.064\mu\text{m}$.